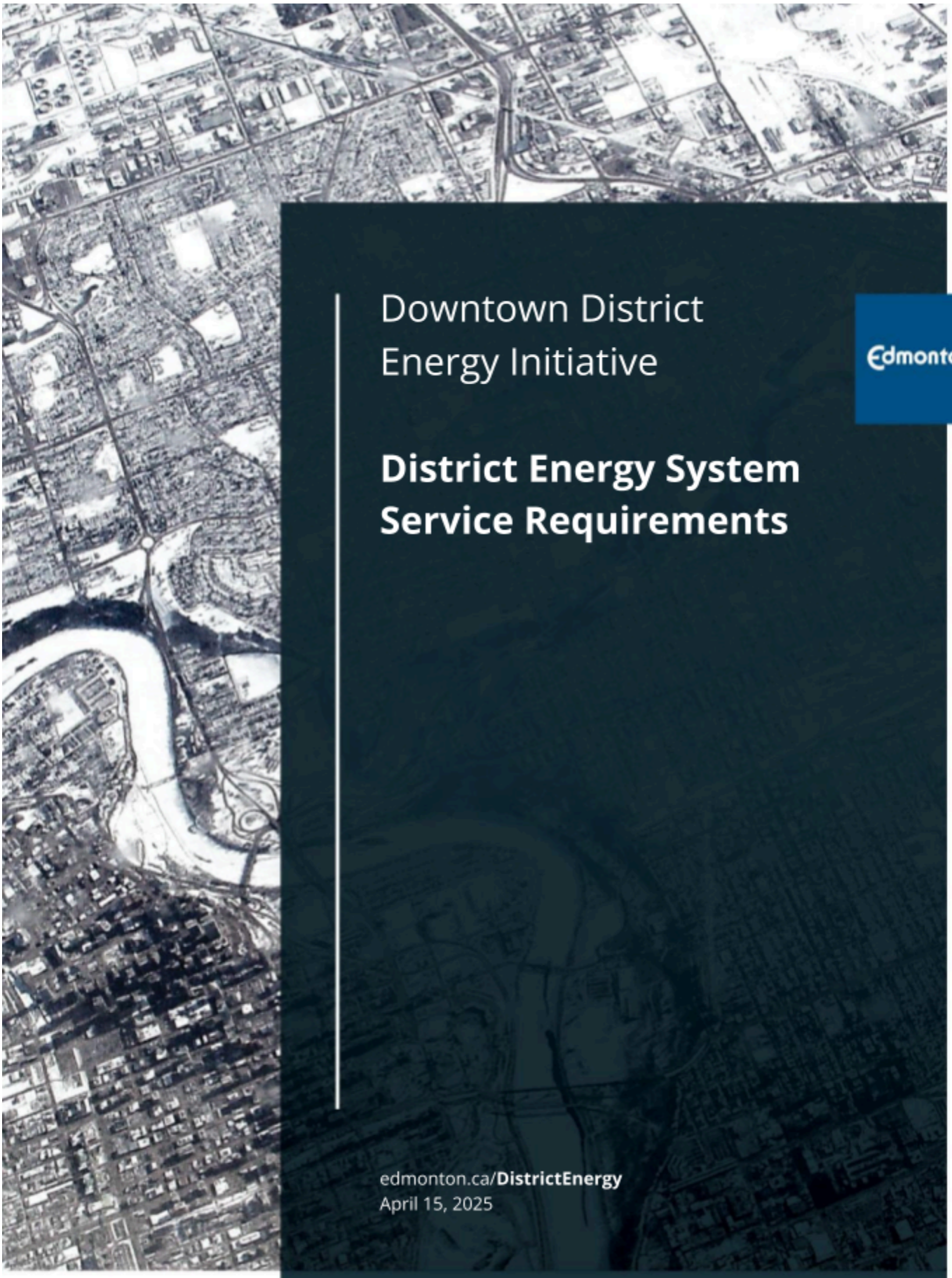

Downtown District Energy Initiative

District Energy System Service Requirements

edmonton.ca/**DistrictEnergy**
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TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

1. PURPOSE

The purpose of this document is to provide guidance for connection to the Downtown District Energy Initiative (DDEI) in Edmonton. This document:

- Defines the terms and roles associated with the Edmonton Downtown District Energy Initiative (DDEI)
- Details the equipment and design parameters associated with a district energy service connection
- Details the process required to obtain district energy compatibility compliance
- Defines and differentiates the equipment ownership between the City and customers
- Defines and differentiates the responsibilities between the City and customers

This document is to be read in conjunction with the City of Edmonton Bylaw 20914 – Downtown District Energy Utility Bylaw.

2. DEFINITIONS, ROLES AND ABBREVIATIONS

- **District energy system:** The material, machinery, equipment and fixtures forming part of the energy supply system used for the purpose of heating or cooling the fluid that flows through the distribution piping system and the service connections and all equipment including the pressure vessels, conduits, pipes, valves, lines, pumps, heat exchangers, energy transfer stations and energy meters, together with all fluid, ancillary appliances and fittings necessary to provide energy to buildings in the service area and all additions thereto and replacements thereof as such system is expanded, reduced or modified from time to time.
- **Energy centre:** A centralized facility for generating and distributing heating/cooling energy within a district energy network.
- **Distribution piping system (DPS):** A closed-loop pipe distribution network carrying hot and/or chilled fluid for the purpose of providing heating and/or cooling energy from an energy centre to multiple customers.
- **Energy transfer station (ETS):** The equipment used to transfer energy between the delivery point and the building mechanical system in a building**.**
- **Service Connection:** The portion of the district energy system extending from the distribution piping system to the delivery point.
- **City:** The City of Edmonton.
- **Customer:** The person who owns or occupies a building who is being provided with the service or who has filed an application for service.

- **Energy meter:** An assembly that measures the amount of energy consumed by a customer.
- **Building mechanical system:** A mechanical system, including an internal space heating, space cooling and heating of domestic hot water (DHW) distribution system for a building.
- **Building:** Any structure used or intended for supporting or sheltering a use or occupancy, such as residential, commercial, institutional, and industrial buildings.

3. DISTRIBUTION PIPING SYSTEM BRANCH PIPING AND CONDUIT

The distribution piping system (DPS) consists of a network of insulated steel pipe and controls conduit routed via existing downtown Edmonton pedways or direct buried. The DPS will be a four-pipe system consisting of two hot water supply/return and two chilled water supply/return. Each customer will have a unique branch take-off from the distribution system mains to the building. The branch piping will enter the building, route to the ETS room (if necessary), and tie-in to the primary side of the energy transfer station. Sizing of the branch piping is to be confirmed as part of the compatibility review (discussed later).

One 25 mm EMT controls conduit will be installed between the building exterior wall and ETS for controls communication. A junction box will be installed on the wall inside the building, directly after the penetration to transition the conduit from outside to inside.

Isolation valves and a bypass will be installed directly after the wall penetration inside the building.

4. ENERGY TRANSFER SYSTEM

The energy transfer station (ETS) serves building space heating loads and can serve space cooling and domestic hot water loads if approved by the City Manager. A typical space heating/domestic hot water ETS schematic is provided in Figure 1. A typical space cooling ETS schematic is provided in Figure 2.

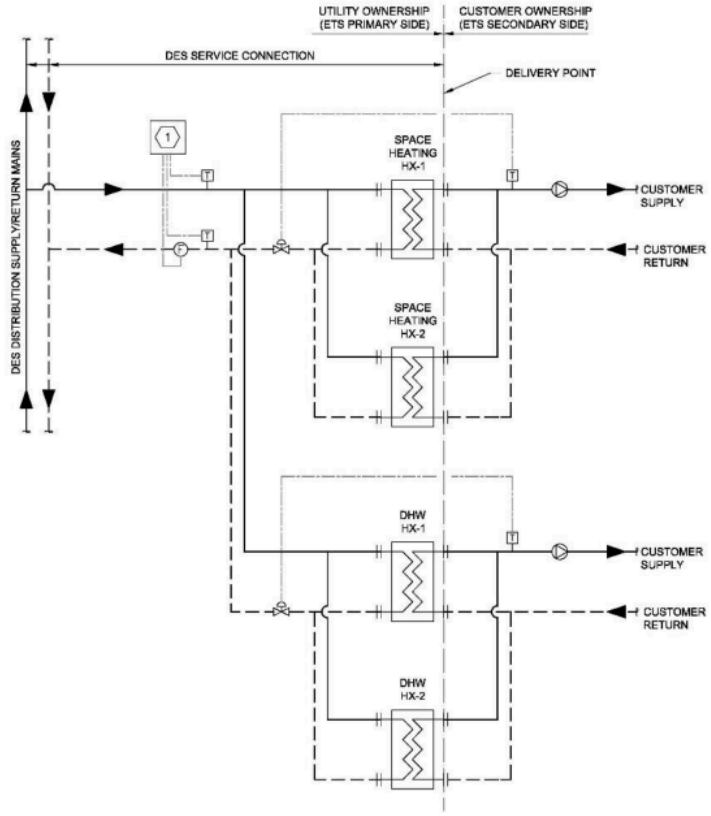

Figure 1. Conceptual Energy Transfer Station Schematic for Space Heating and Domestic Hot Water

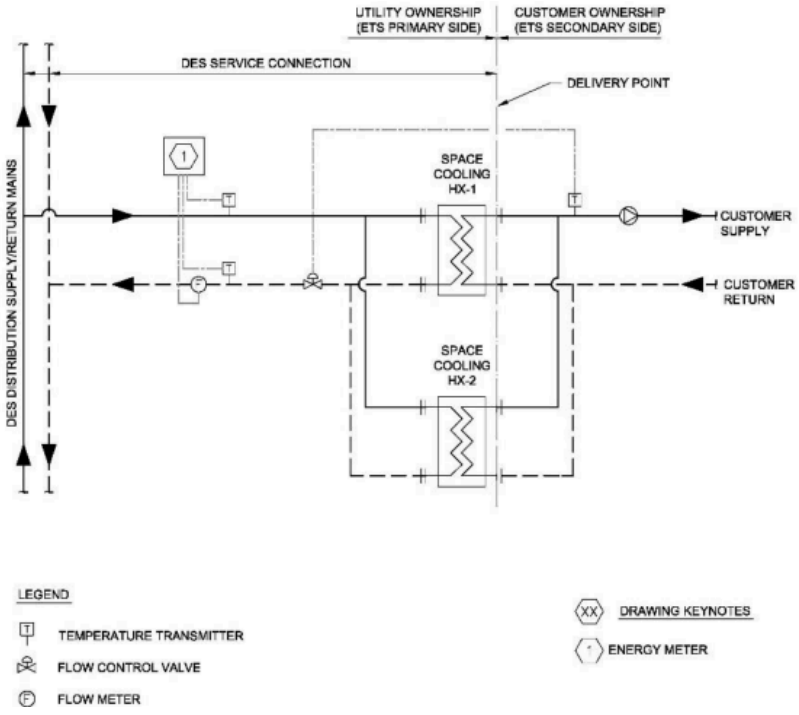

Figure 2. Conceptual Energy Transfer Station Schematic for Space Cooling

Temperature Set Point Limits

The customer is limited to maximum/minimum supply temperature set points for each building load type as identified in Table 1.

	Winter	Summer
Maximum Space Heating	90°C	90°C
Maximum Domestic Hot Water	90°C	90 °C
Minimum Space Cooling	7°C	7°C

Table 1. Secondary Side Supply Temperature Set Point

The preference would be for the existing buildings to operate at as low a heating temperature and as high a cooling temperature as possible to increase the efficiency of the district energy system.

Pressure Parameters

The primary side piping and ETS will have a maximum design pressure of 1,600 kilopascals gauge (kPag). The maximum design pressure for the secondary side of the ETS will be confirmed as part of the compatibility review.

Ownership Delivery Point

The delivery point between City and customer-owned equipment occurs at the ETS secondary side flange connection as identified in Figures 1 and 2.

Heat Exchanger

Figures 1 and 2 identify two heat exchangers per building load type. The two heat exchangers are to be sized at 60 per cent peak design load for redundancy.

Energy Meter

Energy meter(s) will be installed on the primary side of the ETS for billing, monitoring and optimization purposes by the City. The energy meter is approved by Measurement Canada for thermal energy metering.

Controls

The ETS will operate standalone. No controls communication is required between building and ETS. A flow control valve is installed on the primary side of the ETS and will modulate based on the secondary side supply temperature setpoint. The City will monitor ETS temperature, pressure, flow and energy. The customer is to provide the City with a supply temperature set point that will either be hard coded or programmed with an outside air temperature reset schedule.

5.5. DES COMPATABILITY COMPLIANCE PROCESS

Service Area and Application

A service area has been designated by the City of Edmonton for district energy service. A customer located within the service area shall apply to the City for district energy service. If the customer is located outside the service area but within the municipal boundaries of the City of Edmonton, the customer may apply to the City of Edmonton for service. Refer to section 7(2) of the 20914 – Downtown District Energy City Bylaw for more information and a map outlining the service area boundary.

Compatibility Review/Compliance

After the customer has been approved for potential district energy service via the application process, the City will initiate a compatibility review for building service compliance. This review will be in the form of a memorandum and include all parameters identified in Appendix A – Customer Check List. The purpose of this memorandum is to document the compatibility requirements/parameters detailed herein. The memorandum will likely require one or more iterations as the customer and City finalize the compatibility parameters/requirements. Meetings will be scheduled as necessary to expedite the coordination process.

The results of the compatibility review will:

- Confirm whether the customer building is compatible for district energy service or not. The City has the authority to accept or reject the customer based on the results of the compatibility review.
- Act as a basis of design for the City's service connection and customer's building retrofits (if the City has accepted the customer for service).

6. CITY RESPONSIBILITIES

6.1 Design and Installation

The City is responsible for the design and installation of the service connection as identified in Figures 1 and 2. The compatibility review will initiate the design. The City will develop design drawings and specifications associated with the service connection for review by the customer. See Appendix B – City Design Document Template. The customer will be expected to facilitate any site-specific design and installation requirements including but not limited to site visits and construction/commissioning activities.

6.2 Pre-Commissioning

The City is responsible for flushing, cleaning and pressure testing of the service connection.

6.3 Commissioning

Commissioning will be a collaboration between City and customer. The City and its representatives (i.e., consultant, contractor) will be present for commissioning. The City's contractor will lead the commissioning activities with cooperation from the customer.

6.4 Operation and Maintenance

The City is responsible for the operation and maintenance of the service connection. Access will be provided by the customer.

6.5 Energy Metering

The City is responsible for metering the customer's district energy thermal energy consumption. The hot water and chilled water will be metered separately. Any thermal energy submetering of the secondary side of the ETS is the responsibility of the customer.

7. CUSTOMER RESPONSIBILITIES

7.1 Design and Installation

The customer is responsible for the design and installation of all piping and necessary equipment for tie-in to the secondary side of the ETS. The customer is also responsible for any building retrofits required for adherence to district energy compatibility and to accommodate the service connection.

7.2 Pre-Commissioning

The customer is responsible for flushing, cleaning, pressure testing and disinfecting (domestic hot water only) the secondary side of the ETS. See Appendix C – Customer Pre-Commissioning Template. The customer is responsible for temporary connections to facilitate the City's pre-commissioning activities.

7.3 Commissioning

Commissioning will be a collaboration between City and customer. The City and its representatives (i.e., consultant, contractor) will be present for commissioning. The City's contractor will lead the commissioning activities with cooperation from the customer. The customer will be required to actuate secondary side ETS valves and pumps at the request of the City's contractor to facilitate the commissioning process. The customer is responsible for the secondary side mechanical systems during the commissioning process.

7.4 Operation and Maintenance

The customer is responsible for the operation and maintenance of all piping and equipment serving the secondary side of the ETS. The customer is responsible for the pumping requirements associated with the secondary side of the ETS. The customer is responsible for maintenance of the heat-transfer fluid flowing through the secondary side of the ETS for hydronic space heating and cooling systems. The heat-transfer fluid is to be kept free of debris and contamination. Measures should be taken to prevent loss of heat transfer fluid. The heat transfer water quality and corrosion inhibitor concentration shall be maintained within the following range/limits:

- Iron < 1 ppm
- pH 9.5 to 10
- Hardness < 2 ppm
- Chloride < 30 ppm

The customer is responsible for all expenses, risk, and liability for any loss or damage caused by or resulting from the failure of the customer to maintain its building mechanical system in accordance with the equipment manufacturer's guidelines. The equipment consists of any customer mechanical equipment installed on the secondary side of the ETS.

7.5 Metering and Billing

The City will meter the thermal energy on the primary side of the ETS. The customer will be billed based on the primary side ETS metering. Any submetering (if desired) of the secondary side of the ETS is the responsibility of the customer.

The return of thermal energy back to the City is not allowed. Any thermal energy generated within the customer building must be utilized within the building and not transferred to the DES.

7.6 ETS Room Requirements, Access and Restrictions

See Appendix A – Customer Check List for ETS room requirements for compatibility with the DES.

The customer is responsible for providing the City uninterrupted access to the ETS room and service connection for regular maintenance and repairs.

The customer is restricted from tampering, modifying, adjusting and/or actuating any ETS equipment including but not limited to controls, valves, instrumentation and gauges.

7.7 Future Building System Changes

The customer shall inform the City of any future (post-commissioning) building mechanical system changes and/or adjusted building loads that may impact the performance of the ETS. Any change to be approved by the City prior to installation and/or implementation.

7.8 Suspension or Termination of Service

The City may suspend or terminate service to a customer based on the compliance requirements as outlined in Bylaw Number 20914. The customer must adhere to these compliance requirements.

APPENDICES

Appendix A - Customer Check List

Parameter	Status	Details
Existing drawings	☐	- Architectural, mechanical, and structural - Drawings to be provided as required for the design of the ETS and distribution piping system (DPS)
Space heating	☐	Peak demand (kW)
	☐	Peak supply/return temperatures or outdoor air temperature reset schedule (°C)
	☐	Maximum flow rate (litres per second)
	☐	Design pressure (kPag)
Domestic hot water	☐	Peak demand (kW)
	☐	Peak supply/return temperatures or outdoor air temperature reset schedule (°C)
	☐	Maximum flow rate (litres per second)
	☐	Design pressure (kPag)
Space cooling	☐	Peak demand (kW)
	☐	Peak supply/return temperatures or outdoor air temperature reset schedule (°C)
	☐	Maximum flow rate (litres per second)
	☐	Design pressure (kPag)
Drawing markup - exterior wall DPS penetration and proposed DPS route to ETS room	☐	Provide a markup showing preferred location and elevation for DPS exterior wall penetration. Provide preferred route of DPS to ETS room. Customer to identify any required clearance requirements.
ETS room details and dimensions	☐	Provide a plan view drawing showing ETS room with proposed ETS skid location.
ETS skid minimum clearances	☐	1,000 mm clearance required on all sides of ETS skid. 1,000 mm clearance required above ETS skid.

ETS room mechanical requirements	☐	- No housekeeping pad necessary as ETS will be skid mounted - Room to be ventilated as required by code - Room to be heated/cooled as necessary to maintain ambient temperatures ranging from a minimum of 15°C to a maximum 35°C - Floor drain - One 20 mm water service connection hose bib - ETS room preferred location at or close to ground level - ETS room preferred location adjacent to an exterior wall as near as possible to the DPS service connection location - A double access door with dimensions at least 1,830 mm wide x 2,030 mm high preferred - A viable access path for ETS skid(s) from the building exterior to ETS room
ETS secondary side piping requirements	☐	- Primary and secondary side ETS pipe tie-in connections will typically be located at the top of the skid. - Bypass line to be installed on the secondary side of ETS to facilitate building side flushing, cleaning and chemical treatment as necessary.
ETS room electrical requirements	☐	Provide 15 A, 120 V circuit from building distribution system. Circuit to be supplied by generator standby branch if available Terminate circuit in lockable disconnect switch on wall in ETS room.
Building side retrofit design drawings	☐	Develop and provide for review design drawings associated with the retrofit of the existing building mechanical system for tie-in to the ETS.

Appendix B - City Design Document Template

Parameter	Status	Details
Exterior wall DPS penetration and waterpoofing	☐	- City to develop design drawings and specifications. - Isolation valves and bypass will be installed directly after wall penetration within the building. - Junction box to be installed at the conduit wall penetration to transition the conduit from the building exterior to interior.
DPS pipe and conduit routing from exterior wall to ETS room and ETS primary side connection	☐	City to develop design drawings and specifications.
ETS skid(s)	☐	City to develop design drawings and specifications.

Appendix C - Pre-Commissioning Template

Parameter	Status	Details
Flushing and cleaning confirmation	☐	Provide documents providing proof of flushing and cleaning any new secondary side piping installed for the ETS connection.
Domestic hot water disinfection confirmation	☐	Provide documents providing proof of disinfection of any new secondary side domestic hot water piping.
Inspection walkthrough hold point	☐	City to perform a walkthrough inspection of the ETS and piping prior to any commissioning activities.